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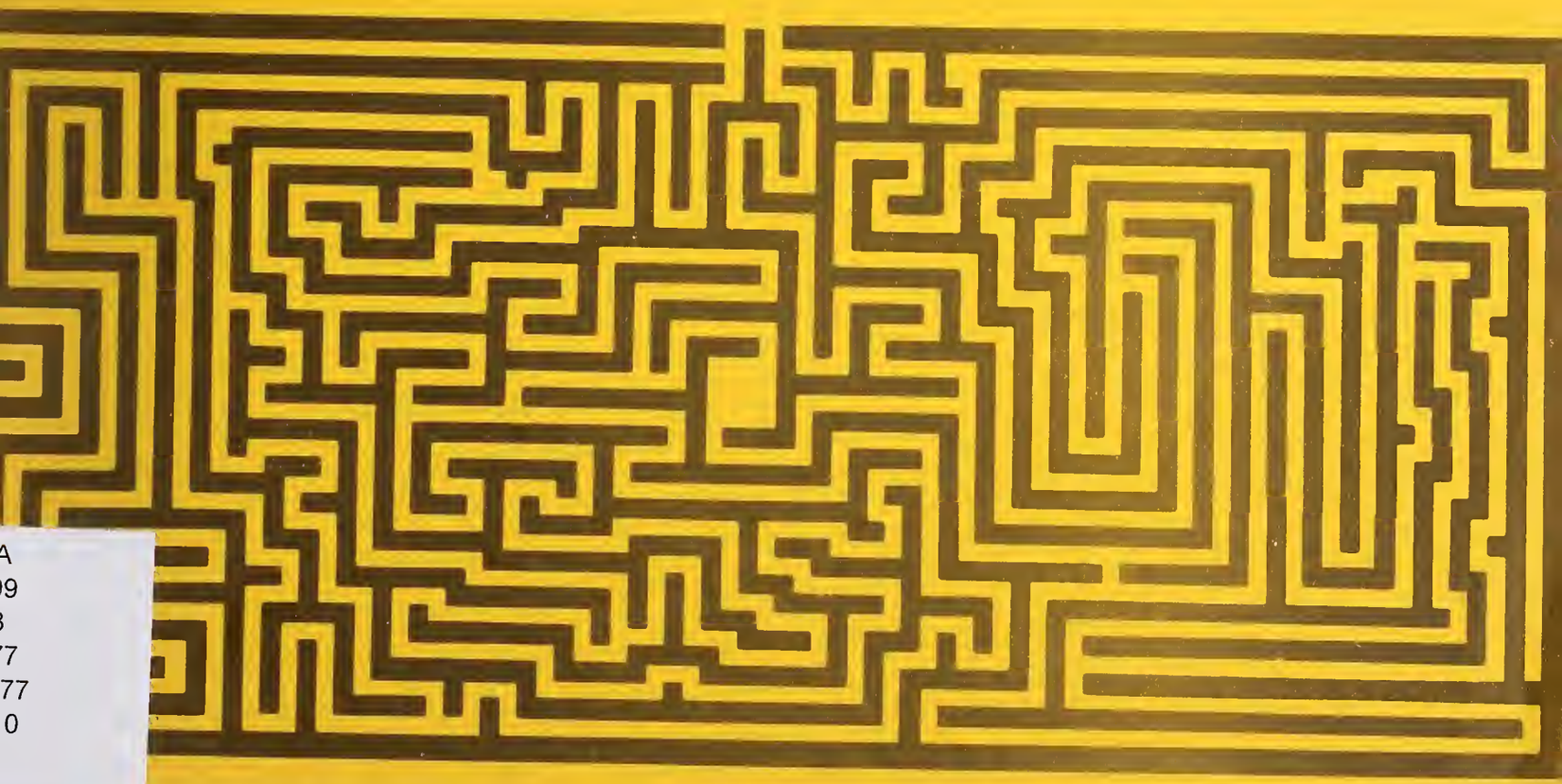
PSRO:
An Evaluation of the Professional Standards Review Organization

VOLUME 10:
ACUTE CARE UTILIZATION REVIEW COSTS: SYNTHESIS OF COMPONENTS AND ESTIMATES FOR A FULLY IMPLEMENTED PROGRAM



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VOLUME 10

PROFESSIONAL STANDARDS REVIEW ORGANIZATIONS: TOTAL NET COSTS OF CONCURRENT PEER REVIEW IN ACUTE CARE HOSPITALS--SYNTHESIS AND PROJECTIONS

PSRO: AN EVALUATION OF PROFESSIONAL STANDARDS REVIEW ORGANIZATIONS

October 1977

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PREFACE

This volume is a part of the evaluation of the Professional Standards Review Organization (PSRO) program as conducted during fiscal year 1976 and 1977 by the Office of Planning, Evaluation and Legislation (OPEL) of the Health Services Administration, U.S. Public Health Service, Department of Health, Education, and Welfare. The emphases of the evaluation were (1) utilization control, quality assurance, and cost-containment impacts and (2) program costs. The evaluation was conducted at a time when the PSRO program was in an early stage of implementation. It indicates what impact the PSRO program had achieved by the start of 1977, provides baseline data for future evaluative work, and offers pilot tests of numerous quality assurance and utilization control evaluation methodologies. Summarized below are the evaluation's major findings.

One major empirical study conducted was an analysis of Medicare utilization data compiled expressly for this evaluation by the Social Security Administration. The Medicare analysis investigated the effects of the PSRO program on hospital days of care per 1,000 enrollees, hospital admissions per 1,000 enrollees and average length of stay. Eighteen active PSRO areas were compared to twenty-six matched nonactive PSRO areas. No aggregate PSRO effect was found on the utilization variables studied. This finding implies that as a "treatment" the PSRO program thus far has not differentially affected Medicare utilization, when compared to other forms of utilization review being conducted in non-PSRO areas. While no overall relative utilization decrease was found, individual experiences varied. Some of the organizations were associated with lower (favorable) utilization while others reflected higher (unfavorable) utilization relative to their matched comparison areas. Generalizations from this data to the future program which will cover the entire U.S. would be tenuous, due to the unavailability of a proper random sample of the total 203 designated PSRO areas.

An analysis of hospital discharge abstract data, primarily derived from the Commission on Professional and Hospital Activities' (CPHA) Professional Activity Study (PAS) system found a very small relative decrease of less than 0.1 day in overall case mix-adjusted length of stay for Federal patients in PSRO hospitals using this abstracting service. When the patient records were sorted by payment sources, there were small, but statistically significant, findings with respect to Medicare and Medicaid average length of stay. Smaller (unfavorable) decreases in case mix-adjusted length of stay were found for Medicaid patients in hospitals under PSRO review than in non-PSRO comparison hospitals. In contrast, greater (favorable) decreases in ALOS were found for Medicare patients. It was also found that, in some instances, the proportion of longer stays in PSRO hospitals experienced a relative decline. The analysis also indicates greater reductions in average length of stay in PSRO areas with higher supplies of long-term care beds.

In contrast to the utilization findings presented above the effectiveness of the PSRO program as a quality assurance mechanism was less directly

measurable. The hospital discharge abstract data did indicate, however, that PSRO review tends to be associated with increases in case mix severity for Medicaid patients, but not for Medicare patients. This severity finding, while tentative because of methodological reasons, does suggest that PSROs may be utilizing bed days more efficiently.

Quality-oriented components of the PSRO program are just now being implemented. A study of a sample of medical care evaluation studies (MCEs) indicates that these studies have been effective in identifying and correcting problems of medical care in hospitals. The number of initial audits reported has grown to over a thousand per quarter, but the number of reaudits reported is small.

Profile analyses are implemented in only a few PSROs.

With respect to program costs, several policy options were considered, all computed in 1976 dollars. Targeted review 1/ is the policy option currently (1978) in force in the PSRO program. The cost of targeted review, assuming review of 20% of all Federal patient hospital stays for 1976, was estimated at $184 million. 2/ In contrast, a fully implemented acute care PSRO program to review 100% of Federal patient hospital stays would have cost approximately $268.5 million in 1976. The associated Federal discharge unit costs, including costs attributed to donated physician time, are calculated at $18.31 for delegated PSRO review and $16.00 for nondelegated PSRO review. 3/

The PSRO program is more expensive than its utilization review predecessors. The cost of nationwide implementation of the original utilization review (UR) regulations was estimated at $81.3 million for 1976, while nationwide implementation of the 1974 revised draft UR regulations in 1976 would have cost about $107.6 million.

In order to "recover" its costs, a 100% concurrent review PSRO program would have to reduce utilization rates of covered populations by 1.6 to 2.05 percent. For a 20% targeted review program, corresponding figures would be 1.1 to 1.4%. Study findings imply that, even though a few PSROs have demonstrated this degree of cost-effectiveness, the PSRO program is not now cost-effective and thus is not yet serving as a cost-containment mechanism.

1/ i.e., review of less than 100% of discharges.

2/ The 20 percent figure was an arbitrary choice for purposes of illustration, and does not necessarily reflect an appropriate level of targeted review for the PSRO program.

3/ These figures are not strictly comparable in that nondelegated review includes only concurrent review, MCE, and abstracting costs, while delegated review also includes the costs of hospital UR committees and those hospital general administration costs which are allocatable to PSRO review.

The report cautions the reader against reaching final conclusions about the program since the evaluation was conducted during the time the program was in the developmental stage. However, the data suggest that PSRO implementation alone, without other changes to the health care system, is not apt to cause significant changes in either hospital utilization rates or associated governmental expenditures. The potential of the PSRO program to effectively assure the appropriateness and quality of care rendered in hospitals could not be adequately assessed within the time-frame of this evaluation. Therefore, more study is urged in several important areas as program development and implementation is continued. Many issues have been identified in the course of the evaluation which should be of value in deciding on the direction of future work.

PSRO EVALUATION REPORT VOLUME STRUCTURE

Volume 1 : Executive Summary

Volume 2 : A Context for PSRO Evaluation: The Program and Evaluation Precedents

Volume 3 : Acute Care Utilization Review Impact: Some Data on the Medicare Experience

Volume 4 : Acute Care Utilization Review Impact: Inferences from a Sample of Hospital Abstract Data

Volume 5 : A Comprehensive Case Study: The Colorado PSRO Experience

Volume 6 : Case Studies of PSROs: A Contextual Analysis

Volume 7 : PSRO Quality Impacts: Inferences from the Medical Care Evaluations

Volume 8 : The Costs of Utilization Review Programs in Hospitals and in PSROs

Volume 9 : Acute Care Utilization Review Costs Associated with the Medicare/Medicaid Programs

Volume 10: Acute Care Utilization Review Costs: Synthesis of Components and Estimates for a Fully-Implemented Program

Volume 11: A Cost-Benefit Context for PSRO Utilization Control Activities

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1. INTRODUCTION AND SUMMARY

1.1 Introduction

The cost synthesis and projection component of this study was designed to estimate peer review costs under various policy alternatives. These costs were determined by performing statistical analyses on data which were collected by other contractors or which were readily available through secondary sources (primarily, Government agencies). The types of costs considered in the synthesis include: (1) PSRO level administrative costs; (2) nondelegated hospital review costs; (3) delegated hospital review costs; (4) Medicare intermediary costs; (5) Medicaid State agency costs; and (6) Bureau of Quality Assurance administrative costs. The sum of these cost components provided an estimate of total Federal expenditures for peer review. The level of expenditures was a function of the policy assumption concerning the type of peer review performed.

This portion of the study produced:

(1) An estimate of total Federal review expenditures for 1976.

(2) Estimates of total Federal review expenditures for 1976 assuming the PSRO program had been fully implemented during 1976.

(3) Estimates of total Federal review expenditures under a mandatory PSRO program for all hospital patients (as implied in some national health insurance proposals).

(4) An estimate of total Federal review expenditure in 1976 for seven case study areas.

(5) An estimate of costs for review of Medicare patients in 1976 for 24 selected PSRO program areas.

Items (1) through (3) are discussed in this volume. Since the estimates for items (4) and (5) were used by other contractors in their project analyses (cf. Volumes 6 and 11), the results for these items were presented in these other volumes of the PSRO evaluation report and not discussed in this volume.

1.2 Summary of Major Findings

The major findings of this research effort are summarized in Tables 1.1, 1.2, and 1.3. Table 1.1 shows the estimated costs for Federal expenditures on peer review in 1976 for (1) the current implementation level, (2) full implementation of the PSRO program and (3) full program implementation that encompasses both Federal and non-federal patients (national health insurance option). The methodology for deriving these estimates is explained in detail in sections 4 and 5 of this volume. A brief statement of the cost estimation procedure for each cost component is provided below.

- Delegated Hospital Costs were estimated by applying a set of multivariate statistical models to all U.S. short-term hospitals available on the 1975 Master Facility Inventory tape.
- Nondelegated Review Costs were estimated by using a weighted average cost of nondelegated hospital review multiplied by the number of nondelegated discharges.
- PSRO Level Costs were developed by multiplying a weighted average cost figure by the total number of Federal discharges subject to PSRO review.
- Medicare Intermediary Costs for 1976 were provided by Arthur Young, Inc. from field interview data (cf. Volume 9 of this report). For a fully implemented program, an average cost figure provided by Arthur Young, Inc.

was multiplied by total Medicare discharges in 1976. The total coverage estimate assumed the same average cost and multiplied it by all hospital discharges. The assumption was made that third-party intermediary payment arrangements would continue under a national health insurance program.

- Medicaid State Agency Costs were estimated from field interview data. These field data were provided by Arthur Young, Inc. for 1976 incurred costs (cf. Volume 9 of this report). Under full implementation, the concurrent review cost portion was subtracted from the 1976 incurred cost estimates, since continuation of concurrent review in Medicaid State agencies now employing it would not be relevant in a fully implemented program. Monitoring costs were boosted by ten percent to allow for the additional monitoring requirements of full implementation. Under National Health Insurance, Medicaid would not exist as a separate program; consequently, no figure was required for the total average cost component under this option.
- BQA Costs were actual figures for 1976 incurred costs. The figures for the other two options were extrapolations of BQA costs, allowing for a 5 percent increase in costs for a fully implemented program, and a 10 percent increase in costs for total patient review (NHI).[1/]

The estimates for delegated hospital, nondelegated hospital, and PSRO level costs for a fully implemented PSRO program and a total patient review program were based on a 68 percent delegated hospital status. This percentage figure was consistent with the current (1977) percentage of delegated hospitals.

[1/] BQA = Bureau of Quality Assurance, now the Health Standards and Quality Bureau of the new Health Care Financing Administration.

The results in Table 1.2 show the estimated primary expenses of peer review. The second column includes the number of hospital discharges relevant to each set of cost estimate assumptions. If all hospital discharges were covered by peer review, then the program coverage would expand by over eight-fold the present program. Costs, however, do not increase at the same rate. The average total program cost per discharge figures found by dividing total discharges covered into total costs gives the following average cost per discharge figures:

- $30.22 for 1976 actual program,
- $22.57 for fully implemented program, and
- $19.19 for fully implemented program covering Federal and non-federal patients.

The decrease in average cost/discharge, as coverage expands, occurs for the following reasons:

- the cost in Medicaid review decrease as coverage expands.
- BQA costs increase at a slower rate as coverage expands.

If these cost savings do not occur, then the cost estimates must be increased. Also, if many States (e.g., New York) implement parallel review programs, then these costs should be included in the Medicaid State agency estimates.

More detailed estimates of fully implemented costs are shown in Table 1.2. The table shows the sensitivity of cost estimates to various delegation status assumptions. The basis for the changes in delegation status is shown by the "barrier level" columns in the table. The number of delegated hospitals was determined in the model by a discriminant function. The barrier level denotes the maximum discriminant function score for a hospital that was permitted into the delegated status category. The higher the

barrier level is, the greater the number of delegated hospitals. The column denoted by +0.3 corresponds to the current percentage of delegated hospitals. This barrier level (+0.3) was used for the cost figures for the fully implemented program and for the national health insurance program in Table 1.1.

The resulting costs in Table 1.2 are remarkably stable. The range in costs from a 36% delegated status to the 85% level is only $13.3 million. One reason for this stability is that the average cost estimates for nondelegated and PSRO level activities were assumed constant for all delegation levels. The modest five percent increase from the lower to the higher delegation levels occurred because delegated review was more costly than nondelegated review in most hospital categories, and the number of discharges covered by delegation status decreased at a slower rate than the number of delegated hospitals. This follows from the fact that "earlier" delegated facilities were larger in bed size so that they accounted for a larger proportion of discharges.

The same stability occurred for estimates of costs for a fully implemented peer review program that covered all hospital admissions. Such estimates would be consistent with a National Health Insurance program that established a comprehensive peer review process. Again, the barrier level was used to adjust the level of delegated hospitals. The variation in cost estimates from the 36 percent to the 83 percent delegation level was approximately $15 million. All of this variation followed from the cost differences of delegated versus nondelegated review for specific hospital categories. The +0.3 barrier level was used for the cost estimates in Table 1.1 for the fully implemented system and for the national health insurance program.

1.3 Organization of Report

This report contains five additional sections. Organizational format and topics described in each of the following sections are detailed below.

Section 2. Background: describes the development of the task efforts and identifies in detail the design of the research effort.

Section 3. Data Sources: identifies contract and governmental secondary data sources, as well as documenting difficulties encountered in collecting data with consistent definitions.

Section 4. Methodology: specifies the types of statistical, simulation and cost building models used to develop the cost estimates and projections.

Section 5. Synthesis of Current Status of 1976 Cost Estimate: brings together those statistical analyses and estimates total Federal review costs in the various components such that a national estimate can be derived.

Section 6. Projection of Peer Review Costs: brings together the statistical analysis to extrapolate 1976 peer review costs under various policy alternatives.

TABLE 1.1: ESTIMATES OF FEDERAL AND STATE REVIEW COSTS FOR (1) 1976 INCURRED COSTS; (2) 1976 INCURRED COSTS WITH FULL IMPLEMENTATION AND (3) 1976 INCURRED COSTS WITH ALL PATIENT PEER REVIEW ($'s in 000's)

		COST COMPONENT						
Cost Estimate Assumptions	Total Discharges (000's)	Delegated Hospital Costs	Non-Delegated Costs	PSRO Costs	Medicare Inter-mediary	Medicaid State Agency	BQA	Total
1. 1976 Incurred Costs	4,045	$ 36,138	$13,230	$ 32,241	$ 9,337	$27,010	$4,300	$122,256
2. 1976 Incurred Costs with Full PSRO Implementation	12,188	$130,079	$23,359	$ 97,141	$ 9,337	$10,558	$4,520	$274,994
3. 1976 Incurred Costs with Full PSRO Implementation Including Non-Federal Patients	35,723	$292,385	$64,705	$284,715	$39,012	--	$4,730	$685,547

TABLE 1.2: ESTIMATES OF FEDERAL AND STATE EXPENDITURES FOR FULLY IMPLEMENTED PROGRAM IN 1976 UNDER VARIOUS HOSPITAL DELEGATION ASSUMPTIONS ($'s in 000's)

	BARRIER LEVEL							
	-.4	-.2	.0	+.2	+.3	+.4	+.5	+.8
A. Delegated Hospital Costs								
1. Number of Federal Patient Discharges In Delegated Facilities (000's)	6,222	7,367	8,357	9,191	9,613	9,979	10,324	11,077
2. Percentage of Total Federal Discharges	51	60	69	75	79	82	85	91
3. Percentage of Delegated Hospitals	36	45	55	63	68	73	77	85
4. Cost Estimate Using Combined Technique*	$ 88,673	$102,285	$115,099	$125,638	$130,079	$134,138	$137,522	$143,289
B. Non-Delegated Review Costs	$ 54,106	$ 43,725	$ 34,748	$ 27,189	$ 23,359	$ 20,042	$ 16,910	$ 12,021
C. PSRO Admin. Costs	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141
D. Subtotal	$239,120	$243,151	$246,988	$249,968	$250,579	$251,321	$251,573	$252,451
E. Medicaid State Agency Costs	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558
F. Medicare Intermediary Costs	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337
G. BQA Costs	$ 4,520	$ 4,520	$ 4,520	$ 4,520	$ 4,520	$ 4,520	$ 4,520	$ 4,520
H. TOTAL	$263,535	$267,566	$271,403	$274,383	$274,994	$275,736	$275,988	$276,866

TABLE 1.3: ESTIMATES OF FEDERAL AND STATE EXPENDITURES FOR PSRO PROGRAM IN 1976 WITH ALL ADMISSIONS SUBJECT TO REVIEW UNDER VARIOUS HOSPITAL DELEGATION ASSUMPTIONS ($'s in 000's)

	BARRIER LEVEL							
	-.4	-.2	.0	+.2	+.3	+.4	+.5	+.7
A. Delegated Hospital Costs Using Combined Technique	$191,851	$227,203	$256,852	$281,157	$292,385	$301,763	$310,912	$326,204
1. Number of Patient Discharges in Delegated Facilities (000's)	18,830	22,201	25,117	27,464	28,589	29,538	30,463	31,999
2. Percentage of Total Discharges	53	62	70	77	80	83	85	90
3. Percentage of Delegated Hospitals	36	45	55	63	68	73	77	83
B. Non-Delegated Review	$156,224	$122,644	$ 96,201	$ 74,915	$ 64,705	$ 56,099	$ 47,710	$ 33,779
C. PSRO Admin. Costs	$284,715	$284,715	$284,715	$284,715	$284,715	$284,715	$284,715	$284,715
D. Subtotal	$629,790	$634,562	$637,768	$640,787	$641,805	$642,527	$643,337	$644,698
E. Medicare Intermediary Costs	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012
F. BQA Costs	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730
G. Total	$673,532	$678,304	$681,510	$684,529	$685,547	$686,319	$687,079	$688,440

2. PROJECT BACKGROUND

2.1 Research Objectives

The PSRO evaluation project included data collection and analysis on the part of several contractors and also several distinct research efforts within HSA/OPEL. In order to clarify the costs of the PSRO program at the Federal level, the HSA/OPEL staff concluded that a task focusing on the synthesis of all the cost data was required. In addition, this integrative research component would focus on the estimation of costs under alternative policy sets both at the National level and at the PSRO level. The PSRO area cost estimates were also used in the cost-benefit component of the evaluation project and in the case studies. (The cost-benefit analyses and the case studies are discussed in Volume 11 and Volume 6 of this Evaluation Report.)

The cost components for the National acute care peer review program cost estimates were:

- PSRO level administrative costs
- Delegated hospital review costs
- Nondelegated hospital review costs
- Medicare Fiscal Intermediary review costs
- Medicaid State Agency review costs
- Bureau of Quality Assurance administrative costs.

As a baseline case and in order to validate the assumptions and the model, cost estimates were first made for the calendar year 1976 under the PSRO program policies in force in 1976. Cost projections were then made for a fully implemented program in 1976 assuming that non-federal hospital admissions were also subject to peer review. Such a review program might

have occurred under National Health Insurance. It must be noted that the methodology for all scenarios run were the same; hence, the description below holds for all alternative studies.

2.2 Project Research Design

Each cost component employed a different method to estimate costs. In this section, the cost estimation procedure for each of the cost components is detailed.

Medicare Intermediary and Medicaid State Agency Review Costs. The estimates of the Medicare Fiscal Intermediary and Medicaid State Agency expenditures for acute care review were developed by Arthur Young under contract HSA 240-75-006. Arthur Young had the responsibility not only of making estimates for 1976 but also National Medicare and Medicaid intermediary cost projections through 1982. It was this contractor's function to interact with Arthur Young in an attempt to insure that consistent definitions of cost were employed in all efforts of cost building. The estimates supplied by Arthur Young were used as a basis for National cost estimates for the two policy alternatives studied. The data were adjusted for anticipated review activity under the policy alternatives being considered.

Bureau of Quality Assurance Costs[1/] - The Bureau of Quality Assurance has the responsibility for overseeing the structure and administration of the PSRO program. Therefore, the Bureau administrative costs were included in any description of Federal review expenditures. Data for BQA expenditures

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[1/] Now known as the Health Standards and Quality Bureau of the Health Care Financing Administration.

were collected by HSA/OPEL staff and prorated by the number of discharges in conditional PSROs. In order to estimate expenses for the larger scale alternatives, the number of PSROs anticipated to be active under the respective policy were discussed with OPEL and costs were increased modestly (5 and 10%) for the policy alternatives.

PSRO Level Costs - Conditionally designated PSROs are responsible for all aspects of review for health care services provided to Federal patients. In order to quantify the associated costs of the PSROs, Macro Systems, Incorporated, collected three years of cost data for 12 conditional PSROs. The data for the first two years represented efforts to establish ongoing review programs. During these years PSRO level costs were heavily weighted towards planning activities. Hence only the third year data represented adequate figures of intensive ongoing review activities. The limited number of data points did not permit the use of any multivariate statistical techniques.

The data collected by Macro at the PSRO level included nondelegated concurrent review costs. These costs were deducted from the total PSRO costs for each in the sample. The resulting total operating cost figure was used to calculate a weighted average cost figure for PSRO level administrative expenditures. The weight used in this situation was the number of discharges subject to review. This procedure yielded an average cost estimate of $7.97 per Federal discharge.

Nondelegated Review Costs - PSROs are required to delegate review activities to individual hospitals that demonstrate a desire and ability

to perform review activities. Hospitals can be fully delegated, partially delegated or nondelegated. The partial delegation status means that the hospital is conducting either concurrent review or medical care evaluation studies but not both. If the PSRO has nondelegated hospitals it must provide personnel to conduct all review activities in these hospitals.

The data for nondelegated costs were provided by Macro Systems. The data limitations noted above eliminated multivariate statistical analysis. A weighted average cost for nondelegated review was calculated using the data available. The weights were based on the number of discharges in nondelegated hospitals for a PSRO. Such a formula yielded a weighted average nondelegated review cost of $9.07 per discharge.

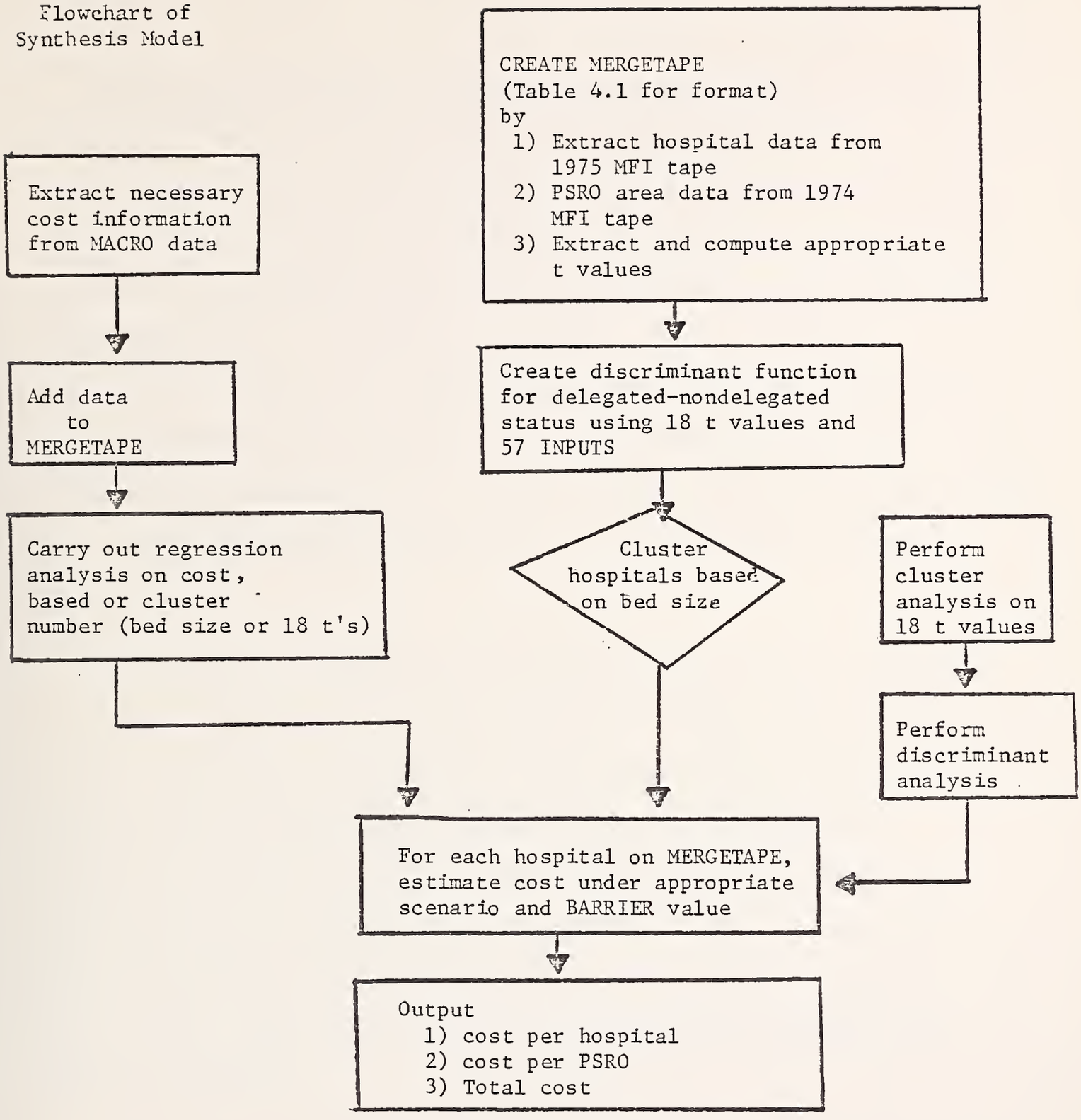
Delegated Hospital Review Costs - The research design for the determination of delegated review costs is shown in Figure 2.1. Macro Systems collected PSRO review cost data for 89 hospitals in 12 PSROs. They also collected "New Utilization Review" data for 23 hospitals in two of the four states still untouched by PSRO review in 1976.[1/] The PSRO hospital data provide the basis for the statistical analysis and projection of delegated hospital costs.

The development of the delegated review costs is divided into three parts:

- Data collection,
- Statistical analysis, and
- Cost estimation models.

[1/] The alternative to PSRO review which was extant in non-active PSRO areas during 1976.

FIGURE 2.1
Flowchart of
Synthesis Model


CREATE MERGETAPE
(Table 4.1 for format)
by
1) Extract hospital data from 1975 MFI tape
2) PSRO area data from 1974 MFI tape
3) Extract and compute appropriate t values
Extract necessary cost information from MACRO data
Add data to MERGETAPE
Create discriminant function for delegated-nondelegated status using 18 t values and 57 INPUTS
Carry out regression analysis on cost, based or cluster number (bed size or 18 t's)
Cluster hospitals based on bed size
Perform cluster analysis on 18 t values
Perform discriminant analysis
For each hospital on MERGETAPE, estimate cost under appropriate scenario and BARRIER value
Output
1) cost per hospital
2) cost per PSRO
3) Total cost

The data from the Master Facility Inventory (MFI) tape for 1975 were collected for each non-federal short-term general hospital in the United States. The information collected included PSRO number, hospital characteristics, employees, occupancy rate, and limited socio-economic data. In addition the delegated status for each hospital was provided by HSA for three time periods: (1) December 31, 1975, (2) June 30, 1976 and (3) December 31, 1976. All this information was merged into one file with information on a hospital specific basis. This file had data on 6783 hospitals. The Macro Systems data for the 112 hospitals above were also merged onto this file. This file provided the data base for the statistical analyses and cost estimation.

The statistical analysis element provides the basis for cost estimates. The details of the methodology and results are discussed fully in later sections. In order to determine most likely delegated status for each hospital in a fully implemented program, a discriminant function of delegated hospitals in conditional PSROs was developed. All hospitals were placed into clusters using two alternatives: (1) a cluster program based on 18 characteristics from the MFI or (2) six-bed size clusters. These clusters served as the basis for the analysis and aggregation for PSRO cost estimates.

The cost estimates were determined from a regression equation. The dependent variable is Total Cost and the potential independent variables included the 18 variables used in the cluster program. The regression cost equations were run for each of the bed size clusters. The cost equation coefficients were employed to estimate costs for delegated hospitals for which field cost data were not available from Macro Systems.

The PSRO program currently applies to only Federal patient admissions. Federal patients include Medicare, Medicaid and Maternal and Child Care programs.[1/] At the time of this analysis, information concerning the proportion of such Federal patients for each hospital in the U.S. was not available for 1976. For the 88 hospitals in the Macro Systems sample the proportion of Federal discharges was provided by Macro Systems. A regression equation on the proportion of Federal discharges was developed for these sample hospitals. Then this "Federal Discharge" equation was applied to other delegated hospitals in order to estimate the number of Federal discharges potentially covered by PSRO review.

Cost estimates for delegated hospitals were made for three policy alternatives:

- those actually delegated as of December 31, 1976
- a hypothetical fully implemented program for 1976
- hypothetical coverage for all hospital patients in 1976.

The current program costs for 1976 were estimated for all hospitals with a delegated review status as of December 31, 1976. The proportion of Federal patients was estimated from the Federal Discharge Equation. The cost coefficients were selected for each hospital according to its bed size cluster. Then the costs for each hospital were summed according to state and PSRO number.

Estimation of the costs of the fully implemented program required the determination of delegation status for hospitals in those PSROs that would become active. The discriminant function was used to estimate the delegated status. Then the methodology as outlined above was used to estimate costs.

[1/] Title XVIII, Title XIX, and Title V.

As a check on sensitivity of review costs to the delegated review discriminant function, several discriminant score "barriers" were employed. The barrier represented the highest discriminant equation value permitted to generate assignment to delegated status for a hospital. The lower the score, the fewer hospitals were assumed delegated. Thus by increasing the barrier level, both the number of delegated hospitals and the proportion of Federal patients in such hospitals increased. Furthermore, the impact of this barrier level can also be traced through to total PSRO delegated review costs.

The hypothetical coverage of all hospital admissions under PSRO review increased estimated 1976 costs significantly. These costs were estimated using the techniques outlined for the 1976 fully implemented program. The costs, however, were applied to all discharges rather than just Federal discharges. The numerical results and detailed descriptions of the cost estimating procedures are provided in sections IV and V.

2.3 Limitations of Research Design

While every effort was made to develop an appropriate research design that would result in useful cost estimates, many design limitations exist in any research project where data are collected from several sources and time and budget resources are limited. The important methodological limitations to this study are discussed below in detail.

PSRO Program Development - In order to develop cost estimates, assumptions needed to be made concerning the level of development for all currently active PSROs and the start-up or planning period that will occur for all PSROs that are yet to be implemented. This is true both at the PSRO level, at the hospital level, and at the Medicare Fiscal Intermediaries

and Medicaid State Agency levels. Stages of development impact on relative expenditures made by these various agencies. In collection of field data, hospitals and PSROs that had had some experience in review activities were selected for site visits. Thus the Macro data attempted for the most part to demonstrate expenditures for currently active PSRO areas with currently limited developmental programs in the acute care area. Our analysis assumed that all PSROs were fully implemented in 1976. Hence, the problem of start up costs and impact on expenditures was avoided in the cost estimates where possible.

A data problem that arises is measuring expenditures for Medicaid State Agencies and Medicare Fiscal Intermediaries. One of the goals of PSRO review is to reduce the level of duplicative review expenditures on the part of such Intermediaries and Medicaid State Agencies. The manner in which data were collected for the sample State Agencies and Intermediaries does not allow for significant confidence in estimation of the true impact that fully implemented PSRO review will ultimately have on expenses. Some PSROs after implementation have brought lower expenses to the relevant Intermediary or Medicaid State Agency. In other instances, the Medicaid State Agencies and Intermediaries have ended up spending more funds. This is a factor that must be considered in future cost projections for the Medicaid State Agencies and Medicare intermediaries under various policy options.

Data Limitations - The extensive data supplied by contractors for delegated review hospitals and PSRO level activities were the vital input into the development of cost estimates for this project. As in any research project, data imposes an important restriction on both the research design and the confidence levels of the results. Because of budget limitations

as well as time constraints, only twelve PSROs were included in the cost sampling activity and 112 hospitals were selected on a stratified random basis from these PSROs in order to determine delegated hospital review costs. Based on our subsequent clustering analysis of all U.S. hospitals, the sample hospitals appear to represent an adequate cross section of hospital clusters except for hospitals with more than 1000 beds. The cost estimates for very large hospitals could not use the regression cost coefficients because no comparable institutions were available in the Macro sample for estimating the regression equations. Instead simple average costs for the largest hospital bed size cluster were used to estimate these costs.

The twelve areas for which PSRO level cost data were collected may not represent adequately the attributes of PSRO areas yet to be implemented. Because of this fundamental limitation, the extrapolation and estimates of PSRO level costs (nondelegated review and administrative costs) is constrained both by the sample size and by the representativeness of the sample PSRO areas.

Consistent Definitional Issues - One of the most vital functions in a cost synthesizing project such as this is to make sure that consistent definitions apply to all of the data sources that must be used. Indeed, much effort was involved in this project to place data in a consistent framework as well as to adjust it consistent time periods. Much of the data collected by contractors were collected over different time intervals, thus requiring cost adjustment because of inflationary factors or extrapolation to consistent twelve month periods. There was also a difficulty among the different cost component institutions in defining

such items as a claim, a review, an episode, etc. All of these factors had impact on the ability to accurately reconcile the data from the several sources. In order to minimize this impact, we attempted to use the concept of a hospital discharge as the overall unit of measurement where possible. Some adjustments were necessary, however, for Medicaid agencies and intermediaries, where the number of claims become the relevant unit of measurement.[1/]

Bureau of Quality Assurance Cost Projections - It was difficult to estimate whether the expenditures of the Bureau of Quality Assurance and its headquarters represented totally fixed cost, or what component might be variable costs. If the substantial portion of the costs were fixed and the existing administrative capacity could handle the new PSROs and delegated hospitals when they become active, then the cost projections for BQA activity in 1976 may have been overestimated. If, however, the BQA costs are variable with respect to the aggregate level of activity, then the basis that is used for estimating BQA expenditures is more reasonable. Of course any such estimates can become subject to dispute in terms of whether there are substantial economies or diseconomies of size and the resulting impact on expenditure patterns. This research project did not emphasize the nature of these size economies for BQA costs, but it should be recognized as a potentially important intervening factor.

External Factors Influencing Peer Review Costs - There are many factors outside of the domain of the peer review program that might influence total Federal review expenditures significantly. For simplicity, these exogenous

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1/ Historically, there have been about 1.05 claims per discharge for Medicare discharges. No such information is available for Medicaid, due to the diversity of State programs.

factors may be divided into four separate categories, recognizing that their impacts may overlap. These categories include: (1) economic factors, (2) sociodemographic factors, (3) health systems trends, and (4) public policy. These factors were not employed in the estimation of PSRO review costs. The use of any cost estimates should recognize the qualitative impact of factors external to the analysis. Consequently, these four areas are discussed in order to indicate the potential impact of the external factors.

Economic Factors - Under the economic domain we can include such factors as economic growth, the level of unemployment that will impact on the level of Medicaid eligibles in the population, and the influence of inflation on cost. Also, the definition of poverty is centrally important to the determination of the Medicaid eligible base.

Sociodemographic - Sociodemographic factors also influence review expenditures. These items include population projections by region or State. Such population trends will influence health care requirements and, hence, review costs. Relative cost patterns may be different in the different portions of the country. The level of family formations would also have an impact on the Medicaid case mix to be considered under PSRO review. Moreover, the age/sex distribution of a population for geographic areas would also result in varying case mix and varying frequency of facility utilization. These factors would also impact on the average lengths of stay and the development of standards for PSRO review.

Health Systems Trends - Trends and advances made in capital investment for health care facilities influence physician decisions regarding the kinds and quality of care necessary for many particular case mixes. The relative

number of health care professionals in specific areas will influence relative health care costs in general and review costs in particular. If non-federal concurrent review becomes more popular it may cause size economies for the cost of all review activities.

Public Policy - In the area of public policy decisions, congressional mandates concerning Medicaid eligibility and required PSRO review activities are important factors to consider when estimating peer review costs. Other congressional programs concerning Medicare coverage and the structure of any National Health Insurance program are likely to influence significantly any future estimates of peer review costs.

This short discussion of external factors influencing PSRO review costs is meant only to make the reader aware of the factors that are quite difficult to integrate into any cost synthesis model. These factors must be considered qualitatively by policy analysts when reviewing the reliability and likely direction of future peer review costs.

3. PROJECT DATA SOURCES

3.1 Introduction

The cost synthesis component project did not require any primary data concerning peer review costs, hospital characteristics, socio-economic area features, intermediary review costs, and Medicaid State Agency costs. All data used in the statistical analysis and estimation components for this project were supplied by other contractors involved in the overall PSRO evaluation project or by other government agencies. The sources of such information are reviewed below along with a review of some of the related data limitations and their influence on the project.

3.2 Contractor Supplied Data

The cost and activity data used to produce delegated hospital review costs, estimates and PSRO level review costs estimates were supplied primarily from field work done by Macro Systems, Inc. as a portion of the overall PSRO evaluation program.[1/] Using a cost finding and cost building technique, three years of review cost expenditures were constructed for each of the 12 PSROs sampled. These costs were segregated into planning and operational components with several sub-categories. Then a total of 112 hospitals, contained in these 12 areas plus two States where new UR is conducted, were visited. For each of these hospitals, review costs for one fiscal year along with extensive information concerning the review process were collected.

The raw data collected by Macro was selectively coded and put in machine readable format. From the data cards, a computer file was developed and

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1/ For detail, see Volume 8 of this Evaluation: The Costs of Utilization Review Programs in Hospitals and PSROs.

this information was merged with hospital characteristics information from the Master Facility Inventory (MFI) tape. This file provided the computer input for our final cost estimates. The reliability of the PSRO cost estimates and hospital cost review figures rely heavily on the accuracy and the representativeness of the Macro Systems data.

Arthur Young, Inc. had the responsibility to collect information and data on the Medicaid State Agencies and Medicare Fiscal Intermediary review costs and projections and expenditures for a sample of State Agencies and Intermediaries.[1/] The purpose in collecting this information was to develop estimates of total review expenditures made by Medicaid State Agencies and Medicare Fiscal Intermediaries. Such data are important since these represent review expenditures that supplement expenditures made by PSROs and delegated hospitals.

3.3 Government Data Sources

Many government agencies collect data that were useful in structuring the statistical analysis portion of our cost estimation models. The Master Facility Inventory (MFI) contains information on each hospital in the United States. Such micro level data were important for determining delegated hospital review costs. The MFI information was the basis of our cluster, discriminant and regression analyses, which we developed for building the cost estimates of the delegated review expenditures.

Other data sources used as input for our analysis included, HSA/OPEL staff, the National Center for Health Statistics, the Bureau of Health

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1/ For detail, see Volume 9 of this Evaluation: Acute Care Utilization Review Costs Associated with the Medicare/Medicaid Programs.

Insurance, Social Security Administration, and the Bureau of Quality Assurance.[1/] Especially important in this analysis has been information from the Bureau of Quality Assurance obtained through HSA/OPEL. The indicator for delegated hospital status was central to our delegated hospital costs estimates. Delegated status was an input to the discriminant function used to predict delegation status for yet-to-be-implemented PSROs. This information was also employed in the cost estimate for all currently delegated hospitals. Other information collected was used to adjust data for various purposes throughout the project. For example, BHI information provides important ratio factors to be used in determining Medicare review costs. These ratio factors were developed for the sample of 24 Medicare PSRO sample used in the cost-benefit portion of the evaluation project.

3.4 Data Limitations

It is important to emphasize the limitations inherent in this project because of the types and nature of data available. First, there is the problem of comparable dates. Information collected by Macro Systems at the hospital level was fiscal year data. Fiscal years among hospitals were not always identical. This caused problems in that data must be collected and corrected to reflect the extensive inflation that took place during this period. Comparable dates were also not used or available for PSRO level expenditures. In some instances only partial year expenses were available and extrapolations were necessary. Such partial year expenditures create difficulties since the discharge pattern for the PSRO is not identical throughout the year. All partial year data were annualized using adjusters supplied by the Bureau of Health Insurance based on hospital admission patterns by specific region of the country.

[1/] Now the Health Standards and Quality Bureau of the Health Care Financing Administration.

Another problem concerned the sample size of data collected. The number of hospitals reviewed for cost information is 112 out of approximately 6,700 short-term hospitals in the United States. Based on subsequent cluster analyses, this information appeared to provide an adequate base for performing the analysis. The sample size at the PSRO level, however, was not so inspired. Since some regions of the country could not be adequately represented and certain PSRO characteristics also were not represented in the sample, the cost estimation procedure became constrained. Only simplistic estimation methods could be used because of the few degrees of freedom on the PSRO level.

Finally, the problem that haunts any researcher relying on secondary data is the comparability of definitions. We found different Intermediaries, different State Agencies, particular delegated hospitals and the PSROs applying slightly different interpretations to such terms as episodes, claims, reviews, etc. This made it very difficult to clarify the concept of average costs per review or average cost per claim since the definitions of claims and reviews appear to vary. Consequently, most of the analysis has been done in terms of cost per discharge. The concept of a discharge was consistent among hospitals, PSROs and Intermediaries.

4. METHODOLOGY

4.1 The Construction of the Data Base

The data base used in the statistical analyses for cost estimation was formed from three sources: (1) the Master Facility Inventory (MFI) tape containing information on 6,783 hospitals in the United States, (2) the sample cost data provided by Macro, Inc., as discussed in Volume 8, and (3) the delegation status for hospitals in the United States at three points in time: June 30, 1976, September 30, 1976, and December 30, 1976. The delegation status information was supplied by the HSA/OPEL staff.

For the purpose of constructing cost estimation models, a subset of variables contained on the MFI tape was selected. The list of the 58 selected variables is given in Table 4.1, (INPUT (1) -- INPUT (58)). These 58 variables were analyzed by forming frequency distributions and contingency tables and by clustering techniques to determine which variables would be most useful in model building. From these analyses, 18 variables, contained in the Z vector, were chosen from the original 58 variables. The 18 variables are also defined in Table 4.1. The delegation status variables and the cost variables supplied by Macro are also delineated in Table 4.1.

4.2 Procedures for Stratifying Hospitals

It was desirable to classify hospitals (and PSROs) into similar sets for the purposes of constructing efficient cost function models for estimating total 1976 costs and for forming projections of total PSRO costs in future years. By forming homogeneous sets of hospitals, the variance of the resulting estimators of cost components and total PSRO costs should be substantially

Table 4.1

ANALYSIS VARIABLES

From Hospital Tape (Master Facility Inventory)--INPUT Vector (All Integer Variables)

Input Variable Number	Description
1	State code
2	Hospital number
3	Control type (government, non-for-profit, etc.)
4	Type of service (general, psychiatric, etc.)
5	Length of stay
6	Pertinent bed change code
7	Date of first bed change
8	Date of second bed change
9	Maintenance of separate unit
10	AHA County code
11	SMSA size
12	AHA membership code
13	Medical school (1 = yes, 0 = no)
14	Professional nursing school (1 = yes, 0 = no)
15	Member Council of Teaching Hospitals (1 = yes, 0 = no)
16	Blue Cross contracting or participating (1 = yes, 0 = no)
17	Medicare certification (1 = 0 = no)
18	AHA Accreditation (1 = yes, 0 = no)
19	Bed size
20	Short term beds

Table 4.1
page 2

Input Variable Number	Description
21	Short term admissions
22	Short term inpatient days
23	Short term discharges
24	Census at time of reporting
25	Number of surgical operations
26	Total expenses
27	Payroll expenses
28	Non-payroll expenses
29	Total assets
30	Full-time medical doctors and dentists
31	Full-time interns and residents
32	Full-time dental interns and residents
33	Full-time "other" trainees
34	Full-time registered nurses
35	Full-time licensed practical nurses
36	Full-time "other"
37	Total full-time employees
38	Part-time medical doctors & dentists
39	Part-time interns and residents
40	Part-time dental interns and residents
41	Part-time "other" trainees
42	Part-time registered nurses
43	Part-time licensed practical nurses
44	Part-time "other"
45	Total part-time employees
46	Intensive care (cardiac) unit beds

Table 4.1
page 3

Input Variable Number	Description
47	Intensive care unit beds
48	Self-care unit beds
49	Extended care unit beds
50	Rehabilitation unit beds
51	Psychiatric inpatient unit beds
52	Family planning service visits
53	Home care department visits
54	Alcoholism inpatient unit beds
55	Chemical dependency inpatient beds
56	Tuberculosis and other respiratory disease beds
57	PSRO number
58	Delegation status (9/1/76)*
59	Delegation status (6/30/76)
60	Delegation status (9/30/76) supplied
61	Delegation status (12/30/76) by HSA/OPEI

*1 = delegated, 2 = nondelegated, 0 = not active in PSRO program.

Constructed Variables Used in the Analyses -- Z Vector (All Real Variables)

Z Variable Number	Description
1	Bed size
2	Medical school affiliation 1 = yes 0 = no
3	Median SMSA size (0,75,175,375,750,1750,400; in thousands)
4	Regional code Z (4) = 1 if hospital in east or northeast = 0 otherwise

Table 4.1
page 4

Z Variable Number	Description
5	Regional code Z(5) = 1 if hospital in south or southeast = 0 otherwise
6	Regional code Z(6) = 1 if hospital in midwest = 0 otherwise Note: if Z(4) = Z(5) = Z(6) = 0, hospital is in the west or southwest
7	Control type Z(7) = 1 if hospital is governmental, non-federal = 0 otherwise
8	Control type Z(8) = 1 if hospital is nongovernmental, nonprofit = 0 otherwise Note: if Z(7) = Z(8) = 0, hospital is nongovernment, profit
9	Type of service Z(9) = 1 if hospital is a general or unit of an institution = 0 otherwise
10	Type of service Z(10)= 1 if hospital is a children's hospital = 0 otherwise Note: if Z(9) and Z(10) = 0, hospital is "other" type
11	Intensive care measure Z(11) = (INPUT (46) + INPUT (47) + INPUT (51) + INPUT (56))/INPUT (19) = "Special beds"/hospital bed si
12	Personnel measure Z(12) = (INPUT (30) + INPUT (31) + INPUT (34) + INPUT (35))/INPUT (19) = "professional full-time employees"/hospital bed size
13	Surgical operations/discharges Z(13) = INPUT (25)/INPUT (23) = number of surgical operations/discharges

Table 4.1
page 5

Z Variable Number	Description
14	Total expenses/bed size Z(14) = INPUT (26)/INPUT (19) = Total expenses/hospital bed size
15	Approval measure Z(15) = INPUT (13) + INPUT (14) + INPUT (15) + INPUT (16) + INPUT (17) + INPUT (18) = Sum of various approval codes
16	Occupancy rate Z(16) = INPUT (23)/(365) + INPUT (19)
17	Total assets/bed size Z(17) = INPUT (29)/INPUT (19) = Total assets/hospital bed size
18	Employees/bed size Z(18) = [INPUT (37) + (0.5 * INPUT (45)]/INPUT (19)

Constructed Variables Used in the Analysis -- The W Vector (All Real Variables)

W Variable Number	Description
1	Blank
2	Bed size cluster number
3-20	Blank

Table 4.1
page 6

Sample Data from Macro, Inc. -- COST Vector (All Real Variables)

Cost Variable Number	Description
1	CSR Costs
2	CR Costs
3	MCE medical audit costs
4	MCE nurse audit costs
5	MCE other audit costs
6	Abstracting costs
7	UR committee costs
8	General administration costs
9	Total review costs
10	Total Federal discharges
11	Total discharges
12	Total Federal discharges/total discharges
13	Donated physician hours
14	Total reviewed discharges

Notes:

1) The formats for the four data vectors are:

   INPUT: 61110

   Z: 18F15.4

   W: 14F15.4

2) The data tape containing INPUT, Z, W, and COST has been delivered to the OPEL/HSA staff.

reduced when contrasted with the variance of estimators produced by simple estimation procedures where all hospitals or PSROs are assumed to be in the same cluster. The efficiency, in a statistical sense, of the classification of hospitals into similar groups for economic analysis has become apparent to a number of researchers in the past five years. An excellent review of classification techniques for forming hospital clusters with similar characteristics is provided by Kosnick.[1/]

Due to time and resource constraints, it was not possible to incorporate the ideas suggested by Kosnick. Rather, three direct and intuitively simple stratification approaches were used in this study: (1) placing all hospitals in one common cluster, (2) stratifying on bed size, and (3) stratifying on the basis of multivariate cluster analysis of the 18 constructed variables (the Z vector in Table 4.1) by hospitals.

The bed size strata were selected from an in-house research study conducted by Phillip and Iyer for the American Hospital Association, Chicago, Illinois.[2/] The strata are:

Stratum	Bed size
1	6 - 49
2	50 - 99
3	100 - 199
4	200 - 299
5	300 - 499
6	500 or more

[1/] K. R. Kosnick, "Methodology and Empirical Validation of a Multi-dimensional Hospital Classification Structure," a dissertation, Northwestern University, Evanston, Illinois, August 1975.

[2/] P. J. Phillip, and R. N. Iyer, "A Taxonomy of Community Hospitals," American Hospital Association, Chicago, Illinois, June 1975.

In reviewing the current literature on classifying hospitals, it is apparent that a rather small number of attributes are suitable for effective classification. The attributes most frequently used in the studies are:

1. Bed size
2. SMSA population size
3. Geographic region
4 Degree of teaching involvement
5. Per capita income.

Based on the Phillip and Iyer study, it might be useful to consider the following additional variables.

6. Long-term facilities as a fraction of total facilities
7. Number of advanced technical facilities/service
8. Number of physicians/1000 population.

While many more attributes have been mentioned as helpful classification variables, analysis has demonstrated that they are either limited in classification power or are highly correlated with one or more of the eight variables listed above.

Based on the literature, it was decided to use cluster analysis to group hospitals by similar characteristics, as suggested by the types of variables mentioned above.

Cluster analysis attempts to group items (hospitals in this case) into clusters (groups) based on a set of attributes corresponding to each item. The steps in the clustering algorithm are:

(1) An attribute matrix of n items (hospitals), each with a vector of m attributes is specified.

(2) The attribute values is standardized by dividing by the appropriate standard deviations.

(3) If desired, a factor analysis may be performed and the attribute vectors replaced by vectors of factor scores.

(4) An n by n triangular matrix is derived where the $(i,j)^{th}$ element gives the similarity between the i^{th} and j^{th} objects. A wide variety of similarity measures have appeared in the literature. However, the most commonly used measures are the squared Euclidean distance and the Pearson product-moment correlation.

(5) The fusion process begins by considering each of the n objects as an individual cluster.

(6) The two clusters, p and q, with the highest value in the similarity matrix are joined together into a new cluster s.

(7) The rank of the similiarity matrix is reduced by one and the similarity between the new cluster s and every other cluster is computed. The similarity between r and s is a linear function of the similarities between r and p, r and q, and p and q.

(8) Steps (6) and (7) are repeated as needed.

The above algorithm, known as the hierarchic fusion clustering algorithm, is perhaps the most widely used in practice.[1/] Other clustering algorithms use a similar set of steps to form the clusters.

The hierarchic fusion algorithm was applied to the 18 Z variables described in Table 4.1 for the 792 delegated hospitals as of August 1976

[1/] J. Hartigan, Clustering Algorithms, John Wiley & Sons, New York, New York, 1974.

and four clusters were formed. For the purpose of forming 1976 estimated delegated hospital costs, separate cost models were constructed for each of the four clusters. To verify the efficacy of formulating the four clusters, a discriminant function was constructed using the four clusters as groups, and was used to classify the 792 delegated hospitals. It was found that 91% of these hospitals were correctly classified into the four clusters, suggesting that the clustering algorithm very successfully grouped the hospitals into relatively mutually exclusive strata.

It is evident from reviewing the literature and from this study that sophisticated stratification and clustering methods for segregating hospitals into groups with similar elements can be successfully employed. In this study, like others, time and resource constraints precluded advanced analysis of the classification problem. For instance, this study did not incorporate any socio-economic data which is available on census tapes as well as from other sources. Measures of per capita income for the county in which each hospital is located would undoubtedly have further reduced the variation within each cluster. It is conceivable that other variables of this type when added to the Z-vector described in Table 4.1 could have led to a more statistically powerful classification schema than the one used in this study.

4.3 The Classification of a Hospital According to Delegated and Nondelegated Status

To formulate estimates of a fully implemented system and estimates for a national health insurance plan, it was necessary to determine the number of hospitals among the current 6,783 active, short-term hospitals which would assume delegated status in a fully implemented system.

In order to classify a hospital as delegated or nondelegated, a discriminant function was constructed based on the 18 Z-variables in Table 4.1 for the 1,192 active hospitals in the PSRO system and given as an input (58). For those hospitals which were delegated as of August 1976 (INPUT(58)=1). The discriminant function determined was:

```
DISC=2.89844-2.08391*Z(4)-1.17221*Z(5)-1.68822*Z(6)-
  0.29515*Z(8)-0.51845*Z(9)-2.74668*Z(11)+0.50336*Z(12)-
  0.17478*(Z(14)/10000.)-0.03314*Z(15)-0.26717*Z(16)-
  0.02952*(Z(17)/10000.)
```

where the Z-variables are described in Table 4.1. All of the variables were significant, but the following six were clearly most important in identifying a delegated hospital:

Z(4), Z(5) and Z(6): Regional codes

Z(8): Control type

Z(9): Type of service (general hospital)

Z(15): Approval (certification) measure.

When applying this discriminant function to the 1192 active hospitals as of August 30, 1976, it was found that the function correctly classified 75% of the delegated hospitals as having delegated status. While this percentage is somewhat low, it was felt that a method based on hospital characteristics would more successfully estimate the number of delegated hospitals among the 6,783 hospitals nationally, than by simply using the proportion, 792/1192, to determine this number. Note that the discriminant function method will not necessarily underestimate the number of delegated hospitals, since it will also "misclassify" a number of the nondelegated hospitals as incorrectly having delegated status.

We should finally note that a hospital was classified as "delegated" if its discriminant score, as determined by the above discriminant function, was less than some predetermined value called a "barrier." For the fully implemented delegated hospital cost estimates, it was found that a "barrier" value of 0.30 classified 68% of the hospitals as being delegated; i.e. 68% of the hospitals on the MFI tape had disc $\leq$ 0.30 = barrier.

4.4 The Determination of the Estimated 1976 Delegated Hospital Costs, the Estimated Costs for a Fully Implemented System, and Estimated Costs for a National Health Insurance Scenario

4.4.1 An Estimate of the Current Total Federal Review Expenditures for 1976 Among Delegated Hospitals

An estimate of the total Federal review expenditures for 1976 among delegated hospitals was determined by the following steps:

(1) Among the 89 hospitals in the Macro sample performing delegated reviews, the cost per Federal discharge was determined for each of the bed size clusters by summing the total cost and dividing by the total number of Federal discharges for all hospitals in each cluster. These ratios are given in Table 4.4.1.

TABLE 4.4.1

The Cost Per Federal Discharge for Each Bed-Size Cluster

Bed-size Cluster	1 6-49	2 50-99	3 100-199	4 200-299	5 300-499	6 500+
Cost per Federal Discharge	$7.70	$9.20	$11.82	$11.17	$8.37	$11.16

(2) A regression equation was developed for predicting the proportion of Federal discharges among all discharges for the 89 hospitals in the sample. The estimated regression equation is:

```
WZ=0.7540388-0.8879533D-01*Z(8)-0.2271544*A(3)-0.5494085D-03*Z(1)+
   $0.3457578*Z(11)-0.1051127*Z(38)-0.4464784D-01*Z(2)+0.2931458D-01*
   $Z(4)-0.1066572*A(5)+0.7608012D-02*Z(6)-0.2087301D-01*Z(7)-0.14378*
   $A(4)-0.2073594*A(2)-0.2210042*A(1)-0.64746D-02*Z(5),
```

where WZ is the proportion of Federal discharges to total discharges, the Z variables are defined in Table 4.1 and

A(1) = Bed cluster I, I = 1,2,3,4,5,6

This regression equation accounted for 22% of the variability in the variable WZ (the R^2 value was corrected for degrees of freedom). In applying this regression equation to the set of delegated hospitals in 1976, it was found that occasionally for some hospitals, one or more independent variables fell outside the ranges over which the regression equation was fitted, based on the sampled 89 hospitals. (This problem with the sample data acquired by Macro Systems was noted earlier.) When this situation occurred for a specific hospital, the average proportion of Federal discharges to total discharges for the sampled hospitals (0.35) was used to estimate the total number of Federal discharges.

(3) A regression equation was developed to estimate the total cost for Federal review for each hospital. The estimated regression equation is:

```
Cost2=40631.23+65.59095*Z(1)+20715.06*Z(4)-875.7444*Z(12)
   $-9439.400*A(4)-13691.47*A(5)-17665.89*Z(2)+6711.542*Z(38)+
   $2863.049*Z(5)-7648.826*Z(6)-5390.869*Z(7)-11689.64*Z(11)+
   $1327.371*Z(8)-0.7983513*Z(3)-11502.23*A(3)-17985.26*A(2)
   $-22140.36*A(1)
```

where Cost2 is the estimated cost of Federal review per hospital, the Z variables are given in Table 4.1 and

$$A(I) = \begin{cases} 1 \text{ if hospital belonged to bed cluster I, I=1,2,...,6} \\ 0 \text{ otherwise} \end{cases}$$

This fitted regression equation accounted for 75% of the variability in the total review costs among the 89 sampled hospitals.

(4) The number of active hospitals (nondelegated and delegated) and delegated hospitals was provided by BQA. At the end of 1976, the number of active hospitals was 2248 and the number of delegated hospitals was 1187. Thus the cost computation for the total Federal review costs among delegated hospitals was based on 1187 hospitals.

The completion of these four steps provided the basis for calculating two estimates of the total Federal review costs among delegated hospitals in 1976:

Method 1

(1) Identify the 1187 hospitals on the MFI tape

(2) Use the regression equation for the proportion of Federal to total discharges (EQ. 4.4.1) to estimate the total number of Federal reviews for each of the 1187 hospitals:

WY=WZ*INPUT(22)

where WY = estimated number of Federal discharges

WZ = estimated proportion of Federal to total discharges

INPUT(22) = total number of discharges (from MFI tape)

NOTE: If it was inappropriate to apply the regression equation given in EQ. 4.4.1 due to extrapolation problems, then, WY = (0.35)*INPUT(22)

(3) Multiply WY times the cost per Federal review given in Table 4.4.1 for the appropriate bed size cluster:

$$C_1 = \sum_J WY*R(I),$$

where C_1 = total estimated cost of Federal review for delegated hospitals in 1976

WY = estimated number of Federal discharges

R(I) = cost per Federal discharge for bed cluster I, I=1,2,...6.

J = index set containing the 1187 delegated hospitals in 1976.

Method 2

(1) Identify the 1187 hospitals on the MFI tape

(2) Use the regression equation for the total cost of Federal review (EQ. 4.4.2). If, for the j^{th} hospital, this regression equation produced an extrapolated estimate, the cost estimate for that hospital using method 1 was substituted. Thus, the cost for the j^{th} hospital, denoted by D_j, is given by:

$$D_j = \begin{cases} \text{Cost2 from Equation (4.4.2)} \\ WY*R(I) \text{ if regression equation provided an extrapolated result.} \end{cases}$$

(3) $C_2 = \sum_J D_j$, where

C_2 = total estimated cost of Federal review for delegated hospitals in 1976.

D_j = cost for jth hospital; determined by (4.4.3)

J = index set containing the 1187 delegated hospitals in 1976.

The two methods were compared on the basis of mean square error for the 89 sampled hospitals.[1/] The regression approach resulted in a 16% reduction in mean square error over Method 1. Thus, the regression approach was taken, resulting in an estimate for the total cost of Federal reviews among delegated hospitals in 1976 of $36,138,000.

4.4.2 An Estimate of the Total Federal Review Cost for a Fully Implemented PSRO System

An estimate of the total Federal review cost for a fully implemented PSRO system was determined by the following steps:

(1) The number of short-term hospitals was determined by using the MFI tape. A total number of 6783 such hospitals was found.

(2) The discriminant equation given by equation (4.3.1) was applied to each hospital for a set of barrier values (see discussion in section 4.3 and Tables 1.2 and 1.3). Using a barrier value of +0.30 (which reflected a 68% delegated status among hospitals), this function was used to classify the 6783 hospitals as being delegated or as being nondelegated. By this method, 4618 hospitals were classified as being delegated in a fully implemented system.

(3) The proportion of Federal discharges to total discharges was determined by the fitted regression equation (4.4.1) discussed in section 4.4.1.

[1/] Mean square error (MSE)

$$MSE = \sum_{i=1}^{89} (C_{Ji} - C_i^A)^2, \quad J=1,2$$

where C_{Ji} = estimated cost by method J for hospital i

C_i^A = actual cost for hospital i

(4) The cost for total Federal review for each of the 4618 delegated hospitals was determined by using Method 2 (EQ. 4.4.4) discussed in section 4.4.2.

Based on this procedure, it was determined that the estimate of the total cost of Federal review in a fully implemented PSRO system was $130,079,000.

4.4.3 An Estimate of Total Federal Review Expenditures Under a Mandatory PSRO Program for all Hospital Patients

An estimate for the total Federal review expenditures for a mandatory PSRO Program for all patients was determined by the following steps:

(1) the number of hospitals participating in a mandatory program was set at 6783, the number of short-term hospitals on the MFI tape as of December 1976.

(2) The cost for Federal review for each of the 6783 hospitals was determined by using Method 3 (EQ. 4.4.4) discussed in section 4.4.2.

Based on this procedure, it was determined that the estimate of the total cost of Federal review in a mandatory PSRO program was $292,385,000.

4.5 Nondelegated Review, PSRO Administrative, Medicare Review, Medicaid Review, and Bureau of Quality Assurance Cost Estimate Methodology.

The methodology used to estimate the remaining cost components of the PSRO program are much less sophisticated than the delegated hospital cost model. As noted previously, the reasons for such limited techniques are (1) the nature of data and (2) the limited degrees of freedom. Since the data were often very aggregate in nature and included some definitional inconsistencies, elaborate statistical analysis for such data sets would have

been inappropriate. Further, for several categories data were available for only a few samples or over only a few time periods. In these cases, given the lack of degrees of freedom, statistical analysis could not be pursued. The methodology used to estimate costs in these remaining categories are detailed below.

Nondelegated Review Costs - Sample cost of nondelegated review was provided by Macro Systems in their review of 12 PSRO sites. One of the cost components in their data collection effort was non or partially delegated review costs. Three years of data for each PSRO were collected. Discussions with Macro Systems led us to conclude that only the most recent year (or period) was useable for our analysis. Earlier figures were often inaccurate because of unreliable accounting systems or were inflated with start-up costs. Since most of the PSROs had been functioning for three years, the most recent period was likely to be most accurate and the level of start-up costs to be excluded from cost figures was minimal.

The procedure used to estimate nondelegated review costs is a weighted average. The weights are the number of discharges in each PSRO. Hence, the weighted average nondelegated review costs in 1976 is:

$$\frac{\sum_{i=1}^{12} NDRC_i}{\sum_{i=1}^{12} NDD_i},$$

where, $NDRC_i$ = nondelegated review costs in the i^{th} PSRO for 1976

NDD_i = nondelegated discharges in the i^{th} PSRO for 1976.

The resulting estimate for nondelegated review in 1976 is $9.07 per discharge. This estimate includes cost and discharge data for seven PSROs.

Two PSROs had very questionable cost figures and were deleted from the calculation. Three PSROs were fully delegated. The range of average nondelegated review costs for the PSROs is from $5.53 to $19.32 per discharge.

The costs were calculated on a per discharge basis instead of a per review basis. Discharge data is readily available, which some PSROs define a review differently. Furthermore, the cost procedure for delegated review was based on discharges. Compatibility among cost components was desirable. Consequently, we decided to use a weighted average cost of nondelegated review per discharge. The nondelegated review cost per discharge can be used to evaluate total nondelegated review costs by multiplying the average cost estimate times the number of nondelegated discharges for alternative policy assumptions.

PSRO Administrative Costs - The PSRO level costs including all costs except non or partially delegated review costs were classified as PSRO administrative costs. These costs represent the activities of developing, monitoring, and administering the local PSRO program. The available data were the same 12 sample PSRO sites used to estimate nondelegated review costs. Again, the data were provided by Macro Systems.

In order to insure consistency, the average cost of PSRO administrative functions was calculated on a per discharge basis. The resulting weighted average PSRO administrative cost for 1976 is:

$$\frac{\sum_{i=1}^{12} PAC_i}{\sum_{i=1}^{12} TD_i}$$

where, PAC_i = PSRO administrative costs in the i^{th} PSRO

TD_i = total discharges in the i^{th} PSRO.

Based on the administrative cost and discharge data for the 12 PSROs the resulting average cost is $7.97 per discharge. The range of average cost figures for specific PSROs was a low of $5.07 and a high of $16.13 per discharge.

The per discharge average cost estimate is the cost figure employed to estimate PSRO administrative costs under various policy alternatives. The administrative costs are found by multiplying per discharge cost times total Federal discharges in a PSRO. Then all PSROs are summed to give a National estimate.

Medicare and Medicaid Review Costs - The review costs attributed to Medicare Fiscal Intermediaries and Medicaid State Agencies were estimated by Arthur Young and Company (AY). It was Arthur Young's responsibility to estimate current national review costs relevant to the Medicare and Medicaid programs. The cost estimates provided by Arthur Young were modified under the selected policy alternatives. The modifications were chosen in conjunction with HSA/OPEL staff to reflect reasonable estimates for the cost categories. For example, Medicaid State Agency costs are projected to decline under a fully implemented PSRO program. The reason is that newly implemented PSROs would perform review functions currently conducted by Medicaid State Agencies.

Bureau of Quality Assurance - Estimates of Bureau of Quality Assurance administrative costs are available in the PSRO Fact Book and in documents provided by HSA/OPEL. The 1976 costs were adjusted to a calendar year basis. Estimates for the selected policy alternatives were made in conjunction with HSA/OPEL staff. For the fully implemented and national health insurance scenarios, modest projected increases in BQA administrative costs resulted.

5. ESTIMATES OF 1976 PEER REVIEW COSTS

5.1 Introduction

The initial synthesis effort involved the estimation of 1976 peer review costs at the current implementation level. The cost estimates were required in order to (1) validate the efficacy of the estimation methods and (2) identify the individual cost estimates for the peer review program. Many estimates for calendar 1976 were necessary since reliable data concerning the cost were not currently available. The reasonableness of the estimation methods must be evaluated against estimates provided by other contractors and estimates from BQA or the Bureau of Health Insurance. The methods used in developing the cost estimation models were discussed in detail in Section 4.

The cost components estimated for calendar 1976 at the current level of implementation included:

- Delegated Hospital Review Costs
- Nondelegated Hospital Review Costs
- PSRO Administrative Costs
- Medicare and Medicaid Costs
- BQA Administrative Costs
- Total Peer Review Costs

These components are discussed in turn in the following subsection.

5.2 Delegated Hospital Review Costs

The delegated hospital review costs for 1976 involved the use of the model outlined in section 4. The following steps from the model were used to estimate delegated review costs:

(1) Identify the delegated hospitals for 1976

(2) Estimate Federal discharges per hospital

(3) Estimate costs of Federal discharges per hospital

(4) Determine total delegated review costs at PSRO and national levels

The number of delegated hospitals were identified from BQA programs for 1976. Data were available concerning delegated status for June, September, and December 1976. The June delegation status was used to identify those hospitals which were operating for full calendar year. Such a procedure overestimates costs for those hospitals that became delegated between January and June 1976. However, the costs are underestimated for those areas that became delegated between June and December. Since the delegation rate was increasing during the latter half of the year, using mid-point delegation status provided conservative delegated hospital cost estimates.

Following the specification of delegated hospitals for 1976, the number of Federal discharges was estimated. Such discharge data were not available on a hospital level. Consequently, a regression equation based on hospital characteristics was used to estimate Federal discharges per hospital (see section 4 for detailed discussion). The estimate of the Federal discharges then became the basis of estimating hospital costs.

The cost estimation equation was then applied to each delegated hospital. The hospital characteristics and Federal discharge level were employed in this cost estimation regression equation. These hospital level costs were then summed to provide PSRO level and national cost estimates. The

PSRO-specific figures were used by other contractors in their evaluation tasks and are not presented in this section.[1/]

Table 5.1 shows the national estimate of delegated hospital review costs in 1976.

TABLE 5.1
DELEGATED HOSPITAL REVIEW COSTS IN CALENDAR 1976

Number of Delegated Hospitals	1087
Estimated Federal Discharge under Delegated Review	2,586,345
Estimated Hospital Review Costs	$36,138,000
Average Cost per Federal Discharge	$13.97

The average cost figure in the table applies only to discharges subject to delegated review. This cost estimate was one component of the total peer review costs. The figure can be compared with other cost estimates provided by other contractors involved in this project.[1,2/] It is likely that our estimate will be higher since our statistical methods resulted in a higher weighting to more costly hospitals because they tend to have a higher proportion of Federal discharges.

5.3 Nondelegated Hospital Review Costs

Many hospitals do not have the capability to perform delegated peer review. Also, some PSRO's have elected not to pursue delegated hospital review. In such cases peer review is performed under the direct auspices of the PSRO. Based on sample data provided by Macro Systems, Inc. and the

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[1/] See Volume 5, A Comprehensive Case Study: The Colorado PSRO Experience, Volume 6, Case Studies of PSROs: A Contextual Analysis, and Volume 11, A Cost-Benefit Context for PSRO Utilization Control Activities.

[2/] See also Volume 8, The Costs of Utilization Review in Hospitals and PSROs.

methodology outlined in section 4, the average cost of Federal discharges in 1976 under peer review in nondelegated areas was $9.07.

The estimate of Federal discharges subjected to nondelegated review was deducted from the total number of estimated discharges less the estimated Federal discharges in delegated facilities. The number of non-delegated review discharges was estimated to be 1,458,655. Consequently, estimated nondelegated review costs for 1976 were:

$$1{,}458{,}655 \times 9.07 = \$13{,}230{,}000.$$

The same procedure was used to estimate specific PSRO nondelegated review costs. These costs were provided to other contractors for their use in the project.

5.4 PSRO Level Administrative Costs

PSRO level administrative costs include all operating costs except nondelegated review costs. The activities in the cost figures included administration, monitoring and criteria development within the PSRO. Based on sample information provided by Macro Systems, Inc. and methodology outlined in section 4, the estimated average PSRO administrative cost per Federal discharge in 1976 was $7.97. Based on the total Federal discharge estimate of 4,045,000, total PSRO administrative costs were estimated at $32,241,000. Again, specific PSRO administrative costs were provided to other project contractors.

5.5 Medicare Intermediary and Medicaid State Agency Review Costs

Medicare Intermediaries and Medicaid State Agencies are involved in utilization review in areas where PSROs are not active. Also, both types of organizations directly monitor the review activity of active PSROs. The

costs of such review were estimated by Arthur Young, Inc. under contract HSA 240-75-0066. This methodology of cost estimation is described in Volume 9 of this research project. The cost estimates for 1976 for Medicare Intermediaries was $9,337,000. For Medicaid State Agencies the cost estimate was $27,010,000.

5.6 Bureau of Quality Assurance Costs

BQA has the overall administrative function for the PSRO program. The cost estimates for BQA during calendar 1976 were based on cost data provided by BQA and HSA/OPEL. The data were available on a fiscal year basis. The cost figures were adjusted on a pro-rata basis to estimate calendar year costs. The resulting cost figure for 1976 was $4,300,000.

5.7 Total Peer Review Costs for 1976

The total cost estimates were sums of the items described in sections 5.2 through 5.6. The national cost estimate is shown in Table 5.2.

TABLE 5.2

ESTIMATED TOTAL PEER REVIEW COSTS FOR CALENDAR 1976

Number of Delegated Hospitals	1,087	
Number of Federal Discharges	4,045,000	% Total Cost*
Delegated Hospital Costs	$36,138,000.	30
Nondelegated Costs	13,230,000.	11
PSRO Administrative Costs	32,241,000.	26
Medicare Intermediary Costs	9,337,000.	8
Medicaid State Agency Costs	27,010,000.	22
BQA Administrative Cost	4,300,000.	4
Total Cost	$122,256,000.	100
Average Cost Per Discharge	$30.22	

*Figures do not sum to 100 because of rounding.

The major cost components of the peer review programs are delegated review costs, PSRO administrative costs, and Medicaid State Agency review costs. The relatively large Medicaid State Agency costs are a result of costly review programs in areas with no active PSRO program. Under a fully implemented program the Medicaid costs would be reduced and the relative size of delegated review and PSRO administrative costs would increase.

The average cost figure in Table 5.1 includes all the cost component figures. Thus for every Federal patient discharged in 1976, we estimated that over $30 was spent on review and monitoring.

6. PROJECTIONS OF 1976 PEER REVIEW COSTS FOR ALTERNATIVE IMPLEMENTATION POLICIES

6.1 Introduction

The cost synthesis component included an objective to consider peer review cost levels under various program implementation policies. In order to construct directly comparable costs, the alternative cost projections were made for calendar year 1976. Thus, the alternative policy cost estimates are directly comparable to the current implementation costs described in section 5. The two alternative policies used for projecting costs are:

- Full PSRO program implementation
- Peer review program covering all inpatient hospital admissions

The cost components to be projected under both policies include:

- Delegated hospital review and nondelegated review
- PSRO administrative costs
- Medicare and Medicaid review costs
- Bureau of Quality Assurance
- Total cost

In section 6.2 the fully implemented PSRO program cost estimates are presented. The cost projections for peer review of all hospital admissions are discussed in section 6.3. This latter alternative is consistent with some National Health Insurance proposals that include a peer review provision.

6.2 1976 Projected Costs of a Fully Implemented PSRO Program

Currently the Secretary of Health, Education and Welfare has designated 203 PSRO areas. Thirty-one of these are statewide PSRO areas. These

designations cover all 50 states plus the District of Columbia, Puerto Rico, Virgin Islands, Guam, American Samoa and the Trust Territory in the Pacific Islands. Full implementation of these areas is anticipated by October 1978, according to the Bureau of Quality Assurance. One way to anticipate the relative cost of a fully implemented PSRO program is to hypothesize such a program in 1976 so that it can be compared with the known partially implemented program costs in 1976.

The projection of such full implementation costs requires more elaborate analysis and assumptions than those employed in section 5. The results of the additional assumptions and analysis are discussed for each cost components. Such information will reflect the sensitivity of costs to certain program assumptions.

6.2.1 Delegated Hospital Review and Nondelegated Review Costs

The costs of delegated and nondelegated review were projected simultaneously in this fully implemented model. Of course, the number of nondelegated reviews is directly related to the number of delegated hospitals. Yet, the number of delegated hospitals were discovered to be a function of hospital characteristics. The percentage of delegated hospitals has been increasing with the PSRO program. Consequently, we evaluated the fully implemented program costs at different percentages of delegated hospitals. Since the percentage of the nondelegated hospitals is the complement to the delegated percentage, the two costs were projected at the same time.

The steps in projecting delegated and nondelegated costs for a fully implemented PSRO program in 1976 are:

(1) Determine delegated hospitals

(2) Estimate Federal discharges in delegated hospitals

(3) Estimate cost of Federal discharges in delegated hospitals

(4) Compute National estimate for delegated hospitals

(5) Repeat steps 1-4 for different delegated hospital characteristics.

A central feature of our cost estimating model is the estimation of delegated hospitals. For the delegated hospitals as of June 1976 a discriminant function was developed. The nature of the function and the test statistics are discussed in section 4. The most likely projection based on current delegation levels and BQA expectations is approximately a 67% delegation level. The discriminant function estimates the specific hospitals that are most likely to be delegated given alternative delegation percentages.

The barrier value for the "delegation discriminant score" was varied from a value of -.4 to a value of .8. These values resulted in 36% to 85% delegated hospitals respectively.

Following the estimate of delegated hospitals for a selected delegation discriminant score, the number of Federal discharges in each delegated hospital was estimated. The discharges were determined using the Federal discharge regression equation.

The third step in the procedure is the projection of hospital costs for the Federal discharges. These costs were estimated using the cost regression equation. The National estimate is the sum of each delegated hospital cost estimate.

In the model a hospital must be either delegated or nondelegated. Thus, the number of nondelegated hospital Federal discharges is the complement of the delegated Federal discharges. Accordingly, for every delegation level the number of nondelegated discharges were determined by estimating Federal discharges at each nondelegated hospital. The sum of these nondelegated Federal discharges was then multiplied by $9.07 which is the average nondelegated review cost. The derivation of this average nondelegated review cost was described in section 4.

The procedure was repeated for several delegation levels. The cost results for delegated and nondelegated review are shown in Table 6.1. The reader should note that even when only 36% of the hospitals are delegated, they represent over 50% of all Federal discharges. This result is caused by large hospitals with specialized facilities that enter the discriminant function most strongly. Also one should note that the variation in cost between low and high delegation percentages is only $13 million or less than 10% of the lowest cost figure. Costs do increase as delegation level increases because delegated review is slightly more costly than nondelegated. Costs increase slowly because smaller hospitals, which enter the discriminant function only at high barrier levels, have lower average costs than larger hospitals.

6.2.2 PSRO Administrative Costs

The total number of Federal discharges is estimated to be over 12,188,000 for 1976. The average PSRO administrative costs are $7.97. Thus, regardless of the percentage of delegated hospitals, the PSRO administrative costs are projected to be $97,141,000.

TABLE 6.1 PROJECTED DELEGATED AND NONDELEGATED HOSPITAL REVIEW COSTS FOR FULLY IMPLEMENTED PSRO PROGRAM IN 1976 FOR SELECTED BARRIER LEVELS ($ IN 000's)

	BARRIER LEVEL							
	-.4	-.2	.0	+.2	+.3	+.4	+.5	+.8
A. Delegated Hospital Costs								
1. Number of Federal Patient Discharges In Delegated Facilities (000's)	6,222	7,367	8,357	9,191	9,613	9,979	10,324	11,077
2. Percentage of Total Federal Discharges	51	60	69	75	79	82	85	91
3. Percentage of Delegated Hospitals	36	45	55	63	68	73	77	85
4. Cost Estimate	$ 88,673	$102,285	$115,099	$125,638	$130,079	$134,138	$137,522	$143,289
B. Nondelegated Review Costs	$ 54,106	$ 43,725	$ 34,748	$ 27,189	$ 23,359	$ 20,042	$ 16,910	$ 12,021
C. Total Delegated and Nondelegated Costs	$142,779	$146,010	$149,847	$152,827	$153,438	$154,180	$154,432	$155,578

6.2.3 Medicare and Medicaid Review Costs

The Medicare costs are assumed to be the same in a fully implemented program as the current program discussed in section 5. The number of Medicare discharges would not change. Hence, the review monitoring costs for the fully implemented projected program should remain at the $9,337,000 level.

Medicaid costs would change. The fully implemented PSRO program should replace some of the review activities performed by Medicaid State Agencies. From the breakdown of Medicaid State Agency costs provided by Arthur Young, Inc., over $16,000,000 was spent for review activities. These costs were developed from Medicaid State Agency figures. The Medicaid State Agencies are, however, likely to continue the monitoring of PSRO review activities. Accordingly, Medicaid State Agency costs are projected to be $10,558,000 under a fully implemented PSRO program.

6.2.4 BQA Administrative Costs

Under a fully implemented program the Bureau of Quality Assurance (BQA) would have a greatly expanded managerial function. In conjunction with HSA/OPEL staff we estimated that BQA could capitalize on previous program development and economies of size. Consequently, administrative costs were assumed to increase only slightly over 5% from current levels. The resulting BQA administrative cost projection is $4,520,000 for 1976.

6.2.5 Total Costs for Fully Implemented Program

The total 1976 projected costs are displayed in Table 6.2. The costs are shown for selected barrier levels on the discriminant function for delegated hospitals. As noted in 6.2.2, the cost projections

TABLE 6.2 ESTIMATES OF FEDERAL AND STATE EXPENDITURES FOR FULLY IMPLEMENTED PROGRAM IN 1976 UNDER VARIOUS HOSPITAL DELEGATION ASSUMPTIONS (Dollars in 000's)

	BARRIER LEVEL							
	-.4	-.2	.0	+.2	+.3	+.4	+.5	+.8
A. Delegated Hospital Costs								
1. Number of Federal Patient Discharges In Delegated Facilities (000's)	6,222	7,367	8,357	9,191	9,613	9,979	10,324	11,077
2. Percentage of Total Federal Discharges	51	60	69	75	79	82	85	91
3. Percentage of Delegated Hospitals	36	45	55	63	68	73	77	85
4. Cost Estimate	$ 88,673	$102,285	$115,099	$125,638	$130,079	$134,138	$137,522	$143,289
B. Nondelegated Review Costs	$ 54,106	$ 43,725	$ 34,748	$ 27,189	$ 23,359	$ 20,042	$ 16,910	$ 12,021
C. PSRO Administrative Costs	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141	$ 97,141
D. Subtotal	$239,120	$243,151	$246,988	$249,968	$250,579	$251,321	$251,573	$252,451
E. Medicaid State Agency Costs	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558	$ 10,558
F. Medicare Intermediary Costs	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337	$ 9,337
G. BQA Costs	$ 4,520	$ 4,520	$ 4,520	$ 4,520	$ 4.520	$ 4,520	$ 4,520	$ 4,520
H. TOTAL	$263,535	$267,566	$271,403	$274,383	$274,994	$275,736	$275,988	$276,866

for delegated and nondelegated costs are relatively stable. This stability flows through to the total projections. The other cost items do not vary with delegation status. Thus, the total projected costs vary only by 5% from the lowest delegation percentage to the largest. Assuming 12,188,000 Federal discharges for 1976, the average review cost per discharge ranges from $21.62 to $22.72 depending on the percentage of delegated hospitals.

6.3 Projected 1976 Peer Review Costs for Program Covering All Hospital Admissions

Under some National Health Insurance proposals, PSRO type review is included as a monitor on demand and quality of services provided. Using the cost estimation procedure outlined in sections 4 and 5, the projection was extended to all hospital discharges. Such an extension is consistent with several of the National Health Insurance review program requirements.

The direct application of our cost model to all discharges requires some cautions. No scale economies were assumed for delegated or nondelegated review. This is important since the peer review program would cover three times as many discharges. Modest cost savings could have a significant influence on cost projections. Also, if the structure of the review process is altered, then our cost building techniques are less accurate.[1/] The cost projection methods are the same as described for the fully implemented program in 6.2.

6.3.1 Delegated Hospital and Nondelegated Review Cost Projections

The procedure for estimating delegated and nondelegated hospital review costs are very similar to the fully implemented program. The only

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[1/] If, for example, only a sample of discharges is reviewed, rather than 100% of discharges.

difference is that all admissions are subject to peer review. Thus, there is no need to estimate the number of Federal discharges. The delegation percentage as determined via the discriminant function provides a range of cost figures. The cost projection procedure is:

(1) Estimate the delegated hospitals

(2) Estimate cost of review in delegated hospitals

(3) Compute the national cost for delegated hospitals

(4) Estimate nondelegated review costs

(5) Repeat steps 1 through 4 for different delegated hospital characteristics.

The number of delegated hospitals is a result of the permitted barrier level or discriminant function score. This barrier level was varied in order to assess the sensitivity of review costs. After hospital delegation status is determined the estimate of review costs for each delegated hospital is made using the regression cost function. The sum of the individual delegated hospital costs is the national delegated review figure.

The nondelegated review costs are estimated by multiplying each nondelegated hospital's number of discharges by the average nondelegated review cost figure of $7.97. The individual hospital figures are then summed to provide a National cost estimate. The range of delegated and nondelegated review costs are shown in Table 6.3.

The cost projections for the selected delegation levels are very stable. The range in costs is under $12 million or 3.4% of the lowest cost projection. The costs increase as delegation status increases since

TABLE 6.2 DELEGATED AND NONDELEGATED REVIEW COSTS FOR 1976 FOR SELECTED BARRIER LEVELS IN A PSRO PROGRAM ($ in 000's)

	BARRIER LEVEL							
	-.4	-.2	.0	+.2	+.3	+.4	+.5	+.7
A. Delegated Hospital Costs	$191,851	$227,203	$256,852	$281,157	$292,385	$301,763	$310,91[illegible]	[illegible]6,204
1. Number of Patient Discharges in Delegated Facilities (000's)	18,830	22,201	25,117	27,464	28,589	29,538	30,463	31.999
2. Percentage of Total Discharges	53	62	70	77	80	83	85	90
3. Percentage of Delegated Hospitals	36	45	55	63	68	73	77	83
B. Nondelegated Review	$156,224	$122,644	$ 96,201	$ 74,915	$ 64,705	$ 56,099	$ 47,710	$ 33,779
C. Total Delegated and Nondelegated	$348,075	$349,847	$353,053	$356,072	$357,090	$357,862	$358,622	$359,983

delegated hospitals are generally more expensive. The reason for the low rate of increase is that smaller hospitals that enter the function as the percentage of delegated facilities increase have lower average costs.

6.3.2 PSRO Administrative Costs

Assuming 35,723,000 patient discharges for 1976, total PSRO administrative costs would be $284,715,000. This assumes a cost of $7.97 per discharge for administrative costs. If economies of scale did exist, it would result in lower projections of the PSRO administrative figure.

6.3.3 Medicare Intermediary Costs

This cost figure is quite difficult to project. Ultimately it will be determined by the format of the National Health Insurance program. We assumed that private insurance intermediaries would continue to act as government fiscal agents. Following discussions with HSA/OPEL staff, we assumed the level of review activity by the intermediaries would decrease. Thus review costs and administrative costs are assumed to be less. The resulting cost is projected to be $39,012,000.

There are no Medicaid cost figures since the National Health Insurance program would replace Medicaid.

6.3.4 BQA Costs

The BQA under a national health insurance program is assumed to continue its administrative responsibility for the peer review program. With the greatly expanded roles of peer review, we are projecting an increase in costs of slightly under 5%. This result assumed significant

economies of scale attached to a greatly expanded peer review program. The cost projection for BQA costs was $4,730,000.

6.3.5 Total Costs

Total 1976 costs for a peer review program for all admissions is shown in Table 6.2. The table integrates all the cost components described above. The sensitivity of costs to various delegation levels is also included. The cost figures are relatively stable. This results from the stability of the delegated and nondelegated costs for various delegation levels. The other cost components do not vary with delegation level. Also, scale economies are assumed with Medicare intermediaries and BQA. The Medicaid program would be replaced by the National Health Insurance program.

Consequently, total cost figures ranged from $673.5 million to $688.4 million - a range of slightly over 2%. The average review cost per discharge for such a program would range from $18.85 to $19.27. The average cost figure is lower than a fully implemented program because of the scale economies noted above.

TABLE 6.3 ESTIMATES OF FEDERAL AND STATE EXPENDITURES FOR PSRO PROGRAM IN 1976 WITH ALL ADMISSIONS SUBJECT TO REVIEW UNDER VARIOUS HOSPITAL DELEGATION ASSUMPTIONS ($ in 000's)

	-.4	-.2	.0	+.2	+.3	+.4	+.5	.7
A. Delegated Hospital Costs	$191,851	$227,203	$256,852	$281,157	$292,385	$301,763	$310,912	$326,204
1. Number of Patient Discharges in Delegated Facilities (000's)	18,830	22,201	25,117	27,464	28,589	29,538	30,463	31,999
2. Percentage of Total Discharges	53	62	70	77	80	83	85	90
3. Percentage of Delegated Hospitals	36	45	55	63	68	73	77	83
B. Nondelegated Review	$156,224	$122,644	$ 96,201	$ 74,915	$ 64,705	$ 56,099	$ 47,710	$ 33,779
C. PSRO Administrative Costs	$284,715	$284,715	$284,715	$284,715	$284,715	$284,715	$284,715	$284,715
D. Subtotal	$629,790	$634,562	$637,768	$640,787	$641,805	$642,527	$643,337	$644,698
E. Medicare Intermediary Costs	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012	$ 39,012
F. BQA Costs	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730	$ 4,730
G. Total	$673,532	$678,304	$681,510	$684,529	$685,547	$686,319	$687,079	$688,440

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